CHAPTER 5
Evaluation of Water Source Options

Florida's 2005 legislative session created the Water Protection and Sustainability Program, which strengthens the link between water supply plans and local government comprehensive plans. In addition, the new legislation provides state and water management district cost-sharing funds for alternative water supply development. The bill adds new requirements for the water supply development component of the regional water supply plans by making the plans more specific. The intent is to make the plans more useful to local water suppliers in developing alternative water supplies, and then provide permitting and funding incentives to local water suppliers if they choose a project included in the plan.

> Section 373.0361(2), Florida Statutes (F.S.), provides:
>
> A list of water supply development project options, including traditional and alternative water supply project options, from which local government, government-owned and privately owned utilities, regional water supply authorities, multijurisdictional water supply entities, self-suppliers and others may choose for water supply development. In addition to projects listed by the district, such users may propose specific projects for inclusion in the list of alternative water supply projects. If such users propose a project to be listed as an alternative water supply project, the district shall determine whether it meets the goals of the plan, and, if so, it shall be included in the list. The total capacity of the projects included in the plan shall exceed the needs identified in subparagraph 1. and shall take into account water conservation and other demand management measures, as well as water resources constraints, including adopted minimum flows and levels and water reservations. Where the district determines it is appropriate, the plan should specifically identify the need for multijurisdictional approaches to project options that, based on planning level analysis, are appropriate to supply the intended uses and that, based on such analysis, appear to be permittable and financially and technically feasible.

As prescribed by Section 373.0361(2), Florida Statutes (F.S.), water supply options, including traditional and alternative water supplies, as well as conservation and reuse projects were evaluated to meet the future urban, agricultural and natural systems needs of the Lower West Coast (LWC) Planning Area. Traditional sources in the LWC Planning Area include the Surficial Aquifer System (SAS) and Intermediate Aquifer System (IAS), and fresh water from surface sources, such as the Caloosahatchee River. Alternative water supplies or nontraditional sources include seawater or brackish water, surface water captured during wet-weather flows, new storage capacity, reclaimed water, storm water for consumptive uses, and any other nontraditional source used by the planning region. These options may make additional water available from historically used sources by providing improved management of the resource, or there may be a new source of water specific to that service area. **Table 2** presents the South Florida Water Management District's (SFWMD or District) classification of water source options.

Table 2. The SFWMD's Classification of Water Source Options.

Traditional	Fresh Groundwater	
	Fresh Surface Water	
Alternative	Brackish Water	Groundwater
		Surface Water
	Captured Stormwater / Surface Water	Underground (i.e., Aquifer Storage & Recovery)
		Aboveground (i.e., Reservoir)
	Reclaimed Water	Domestic Wastewater Treatment Facility Used for Beneficial Purposes
		Seasonal Storage (i.e., Aquifer Storage & Recovery)
	Seawater	Surface Water
	Other	Nontraditional sources identified in Water Supply Plans
		Conveyance facilities/operable structures for water supply
Conservation		

The following evaluations of water source options for the LWC Planning Area are made within the context of the issues previously identified in **Chapter 4** and are specific to this region. Each water supply option includes a brief discussion on the sustainability of the resources, potential impacts to the natural systems and economic costs. The *Consolidated Water Supply Plan Support Document* (SFWMD 2005–2006) provides additional information pertinent to the estimated costs of each option. The costs presented in this chapter and the *Consolidated Water Supply Plan Support Document* are intended primarily to enable comparison of the general costs of one type of supply relative to another. These costs must not be viewed as a substitute for the detailed evaluation that should accompany site- and utility-specific feasibility and design studies necessary to make decisions about, and to construct, such facilities.

TRADITIONAL SOURCES

Traditional sources include those sources that have historically been used as the primary source of water. Traditional sources can change from region to region based upon the ease of source availability and water quality. Where traditional sources have been determined to have limited availability, alternative sources of water must be identified and developed.

In the LWC Planning Area, traditional sources of water have typically included the SAS, IAS, fresh surface water from the Caloosahatchee River, and, to a limited extent, other fresh coastal surface water systems.

As discussed in earlier chapters, the SAS and IAS are the primary sources of fresh groundwater for urban and agricultural use in the LWC Planning Area. However, any significant increase in withdrawals from these aquifer systems will continue to be constrained by resource protections limiting saltwater intrusion, wetland impacts, and impacts to existing legal users and other regulatory considerations. Additional supplies may be developed and permitted from these traditional sources depending on the quantities required, local resource conditions and the viability of other supply options. Opportunities may also exist to capture additional freshwater resources for public supply through expansion of the reclaimed system and retirement of existing irrigation or domestic wells. Wetland rehydration efforts using reclaimed or stored surface water to mitigate pumpage impacts may also allow limited increases in freshwater production.

Costs for individual components of water supply projects, such as wells, pumping equipment, pipeline and treatment facilities are discussed in the *Consolidated Water Supply Plan Support Document*. In order to provide an estimate of fresh groundwater supply development costs for comparative purposes with other supplies, a hypothetical fresh groundwater supply project was evaluated based on component costs in the *Consolidated Water Supply Plan Support Document*, and personal communications with District engineering design consultants. The project presumed development of a new 5-MGD water supply. The project employed lime softening followed by chlorination as the treatment process.

Project costs include facility design, construction, general operation and maintenance, land costs, and raw and finished water storage (at the treatment facility site). No high-service pumping or connection costs for finished water transmission mains were included in the estimate. It was assumed all pipelines required a 35-foot permanent easement. Property requirements include 1 acre per MGD for treatment capacity, and 1 acre per production well site. Unit costs (per acre or per square foot) are identified in **Appendix H**. Storage needs were presumed at 50 percent of treatment capacity, with design and construction costs for storage estimated at $0.32/gallon. Annual operation and maintenance of storage and pipelines was assumed at 2 percent of the capital cost of installation. Source water is presumed to be provided by six, 1-MGD wells arranged in a linear pattern extending 2.5 miles out from the treatment facilities. Unit costs ($/1,000 gallons) reflect capital amortized at 5.65 percent for 20 years. **Table 3** summarizes the results of this exercise.

Table 3. Estimated Project Costs for Development of Fresh Groundwater.

Treatment	Total Capital	Capital $ per gallon of Capacity	Annual O & M	Unit Cost ($/1,000 gallons)
5 MGD Lime Softening	$14,700,000	$2.90	$1,100,000	$1.28

The Caloosahatchee River is a significant water source for agricultural use in Hendry and Glades counties. Water withdrawals support sugarcane, citrus and row crop operations, and other agricultural uses. Capture of public supply water from the river is limited to about 5 MGD by Lee County. The reliability of existing supplies from the Caloosahatchee River should be improved through the construction of the C-43 West Reservoir in Hendry County. The reservoir will capture water at high-flow times from the system and release water to meet environmental requirements and existing user demands in the low-flow periods.

Future increases in supply from the Caloosahatchee River may be constrained by a revised management schedule for Lake Okeechobee, which is designed to maintain lower levels in the lake; the MFLs established in 2002; initial water reservations that are currently being developed for the system; and, the environmental requirements associated with the Comprehensive Everglades Restoration Plan (CERP) and Acceler8 projects. The viability of the Caloosahatchee River to meet new water supply needs will be determined after the new lake management schedule is selected and the effects of the other regulatory and project constraints on this system are evaluated.

Caloosahatchee River

ALTERNATIVE WATER SUPPLY SOURCES

Each alternative water supply source option is discussed in this section to identify its potential for use in the LWC Planning Area.

Seawater

This source option involves using seawater (typically 35,000 milligrams per liter (mg/L) total dissolved salt) from the Atlantic Ocean or the Gulf of Mexico as a raw water source for desalination. The ocean is an unlimited source of water (salt water) from a quantitative perspective; however, removal of salts (desalination) is required before potable and irrigation uses are feasible. To accomplish salt removal, a desalination treatment technology would have to be used, such as distillation, reverse osmosis (RO) or electrodialysis reversal (EDR).

North Lee County Water Treatment Plant
Reverse Osmosis Membrane Unit

As part of the 2005–2006 water supply planning process, it was concluded that seawater desalination is a potential alternative supply that merits future consideration. At this time, water cost data for seawater desalination facilities range from \$2.49/1,000 gallons for the 25-MGD Tampa Bay Water desalination plant in Hillsborough County to \$8.77/1,000 gallons for water from the new 36-MGD facility in the country of Singapore. Co-location of seawater desalination facilities with power plants appears to reduce costs. The

SFWMD will be conducting a Co-Located Desalination Feasibility Study and a Pilot Saltwater Desalination Project during the next three years. The study location for the feasibility and pilot work has yet to be determined. Based on pilot study results and data from Tampa Bay Water's 25-MGD Seawater Desalination Plant, which is expected to be operational in the fall of 2006, seawater desalination will receive additional consideration in the 2011 LWC Plan Update.

Brackish Surface and Groundwater

Brackish groundwater is typically defined as water with a total dissolved salt concentration between 1,000 milligrams per liter (mg/L) and 10,000 mg/L. The terms fresh, brackish, saline and brine are used to describe the quality of the water. Although brackish supplies in the low range of these salinities may be used for some agricultural purposes, they do not meet public drinking water standards. Advance treatment technologies, such as reverse osmosis (RO), electrodialysis (ED), or electrodialysis reversal (EDR), must be employed before this type of supply is suitable for human consumption.

The Upper Floridan Aquifer is the principal source of brackish supply in the LWC Planning Area. Supply from the Floridan Aquifer is not considered to be a limited resource in the LWC Planning Area. It is expected that a majority of new municipal quantities for the region will be met using the Floridan Aquifer System (FAS). Water from the FAS throughout the planning area is generally nonpotable due to salinity and requires desalination or blending to meet potable standards. Utilities in the LWC Planning Area using the FAS as a drinking water source typically employ reverse osmosis (RO) or an electrodialysis (ED) process to purify the water for distribution and use.

Agricultural operations in the LWC Planning Area use water from the FAS primarily as a supplemental irrigation or blending source when surface water or supplies from the SAS or IAS are limited, and as a primary source in areas where the salinity of the resource is acceptable for irrigation. Although some water quality deterioration in the Floridan Aquifer has been associated with pumping, no other environmental impacts have been identified in association with use of this resource.

In order to provide an estimate of brackish groundwater supply development costs for comparative purposes with other supplies, a hypothetical brackish groundwater supply project was evaluated based on component costs in the *Consolidated Water Supply Plan Support Document,* and personal communications with District engineering design consultants. The project presumed development of a new 5-MGD finished water supply from a brackish groundwater source and water treatment through RO followed by disinfection using chlorine.

Project costs include facility design, construction, general operation and maintenance, land costs, raw and finished water storage (at the treatment facility site), and concentrate disposal (via deep well injection). No high-service pumping or connection costs for finished water transmission mains were included in the estimate. All other project costs and assumptions relative to property requirements and water storage needs are the same as in the fresh groundwater example. Source water is presumed to be brackish (less than 10,000 mg/L total dissolved solids (TDS), delivered by eight, 1-MGD wells arranged in a linear pattern extending 3.5 miles out from the treatment facilities. Treatment recovery is assumed to be approximately 80 percent. **Table 4** summarizes the results of this exercise.

Table 4. Estimated Project Costs for Development of Brackish Groundwater.

Treatment	Total Capital	Capital $ per gallon of Capacity	Annual O & M	Unit Cost ($/1,000 gallons)
5 MGD Brackish Groundwater RO	$25,400,000	$5.08	$2,100,00	$2.33

Surface Water Captured Predominately During Wet-Weather Flows

The capture of surface water, primarily during wet-weather conditions and storage either aboveground or underground for future use, can provide a stable water supply for municipalities, agricultural uses and environmental management. Typically, the six-month, summer rainy season provides more than 65 percent of the annual rainfall in southwest Florida, creating the opportunity for such withdrawals.

Often these systems are designed around a flow-based withdrawal schedule (Tampa Bay Water, Alafia River, Water Use Permit 2011794). This enables initiation of withdrawals when flow in the river/canal systems rise above a specified environmental level and allows the capture of a percentage of flow from the system above that environmental level. Systems such as these capture only an environmentally sustainable percentage of flow, ensuring the freshwater needs of the river and estuary are not adversely affected by the withdrawals. Yields will depend primarily on the seasonal flow characteristics of the surface water system, the freshwater requirements of the estuary and the availability of storage.

C-43 West Reservoir Construction.

In the LWC Planning Area, the District is designing and testing such a system for the Caloosahatchee River. The C-43 West Reservoir, which is under construction in Hendry County and one of the District's Acceler8 projects, will capture a portion of the river's flow during wet-weather conditions and store it in an off-stream reservoir. During dry periods, water will be released from the reservoir to meet environmental requirements in the Caloosahatchee River and to sustain existing water withdrawals on the river. Opportunities to capture seasonal surface water resources also exist in a number of the canal and river systems in the Big Cypress Basin.

In order to provide an estimate for the development of potable surface water supplies for comparison with other sources, a hypothetical fresh surface water supply project was evaluated based on component costs in the *Consolidated Water Supply Plan Support Document*, and data from Tampa Bay Water's Master Water Plan projects. The project estimate presumed development of a new 5-MGD supply from a surface water source, and the associated raw water ASR system needed to ensure the 5-MGD project yield. The withdrawal facility was sized at 15 MGD to enable harvest of a full year's supply within 153 days from June through October. Water not immediately processed for distribution at the surface water treatment facility was filtered, disinfected and placed in a raw water ASR system. Recoveries from the ASR system were presumed to be 75 percent.

Treatment for the finished water supply includes conventional surface water treatment (coagulation, flocculation, sedimentation, filtration and disinfection). The finished water treatment and disinfection system was sized to operate at 5 MGD. A separate 10-MGD filtration and disinfection system was included on-site for the raw water ASR system.

Project costs include facility design, construction, general operation and maintenance, land costs, and raw and finished water storage. No high-service pumping or connection costs for finished water transmission mains were included in the estimate. Property needs were presumed to be 2 acres for the intake and pump station. Capital costs for treatment facilities included land costs for a 5-acre treatment plant site, and an additional 10 acres (same location) for the ASR system. It was presumed the surface water intake would be located within 1 mile of treatment facilities and that all 10 ASR wells would be located adjacent to the treatment facility. Pipeline assumptions, including easement requirements, and required ground storage are the same as in the fresh groundwater and brackish examples. **Table 5** summarizes the results of this exercise, with costs for the associated raw water ASR system shown separately in the table.

Table 5. Estimated Project Costs for Development of Finished Water.

Project	Total Capital	Capital $ per gallon of Capacity	Annual O & M	Unit Cost ($/1,000 gallons)
5 MGD Finished Surface Water, coagulation/sedimentation/filtration	$17,600,000	$3.52	$770,000	$1.24
Raw Water ASR (10 wells, 1.53 billion gallon storage plus filtration/disinfection)	$9,900,000	$1.98	$1,100,000	$1.06
System Total	$27,500,000	$5.50	$1,870,000	$2.30

New Storage Capacity for Surface or Groundwater

Storage is an essential component of any supply system experiencing variability in the availability of supply. In Florida, the most common types of water storage include in-ground reservoirs, aboveground impoundments and ASR.

Aquifer Storage and Recovery Technology

Aquifer storage and recovery (ASR) is the underground storage of storm water, surface water or reclaimed water, which is appropriately treated to potable standards and injected into an aquifer through wells during wet periods. The aquifer (typically the Floridan Aquifer System in south Florida) acts as an underground reservoir for the injected water, reducing water loss to evaporation. The water is stored with the intent to later recover the water for treatment and reuse in the future during dry periods.

Aquifer storage and recovery technology shows promise both for treated and untreated water by providing a storage option during periods of water availability. This technology is currently being used by several utilities at the local level. The level of treatment required after storage and recovery depends on the use of the water, whether it's for public consumption, surface water augmentation, wetlands enhancement, irrigation or a barrier for saltwater intrusion. Because ASR provides for the storage of water that would otherwise be lost to tide or evaporation, it represents a crucial water supply management strategy for Florida's future.

To date, a total of 28 ASR wells have been constructed within the District. Most of these wells store potable water, although other source waters include raw groundwater, and raw or treated surface water. Approximately 25 percent of the 28 existing ASR wells are operational, while 43 percent are in various stages of operation or testing. The remaining wells are categorized as inactive. In addition to urban uses for ASR, the District, in cooperation with the U.S. Army Corps of Engineers (USACE), is pursuing regional ASR systems as part of the CERP. More than 300 ASR wells are planned as part of the CERP, and most of these are planned around Lake Okeechobee. In the LWC Planning Area, there are currently 14 ASR wells, six of which are operational, seven are in operational testing and one is inactive.

Project costs for two ASR systems were evaluated in the *Consolidated Water Supply Plan Support Document*, including a 2-MGD potable ASR system and a 5-MGD raw surface water ASR system. Unit cost estimates ranged from \$0.44/1,000 gallons for the potable system to \$1.06/1,000 gallons for the surface water system. The unit cost difference between the potable ASR and the raw water ASR system reflects a remote location, and pipeline costs for the surface water ASR well and a microfiltration treatment system for the injected raw surface water.

Aquifer Storage and Recovery Well

Local and Regional Reservoirs

Surface reservoirs provide storage of seasonably available resources for use during dry times, improve irrigation efficiency and can be used to improve stormwater quality. For example, small-scale (local) reservoirs are used by individual farms for storage of recycled irrigation water or the collection of local stormwater runoff. These reservoirs are also useful in providing water quality treatment before off-site discharge. Large-scale reservoirs (regional) are used for stormwater attenuation, water quality treatment in conjunction with stormwater treatment areas and for storage of seasonally available supplies for use during dry times.

Due to environmental and topographical considerations in south Florida, new surface reservoir storage is generally off-stream, meaning no damming of the river is involved to create the reservoir. Water is typically pumped from rivers and canals during wet-weather conditions and stored in an aboveground or at-grade reservoir for use in the dry season. The previously mentioned C-43 West Reservoir in Hendry County will operate in such a manner. The C-43 West Reservoir's design includes up to 52 billion gallons of off-stream storage for water captured from the Caloosahatchee River during high flows. Reservoir releases will be made to meet environmental requirements and sustain the resource for existing permitted users.

Off-stream reservoirs recently completed in Florida include the Tampa Bay Reservoir in southern Hillsborough County, which began operation in spring 2005. This system has the capacity to store up to 15 billion gallons of water from the Alafia and Hillsborough rivers and the Tampa Bypass Canal. Based on the pumping and treatment system installed, the annual average water supply yield of the two rivers and the Tampa Bypass Canal without the reservoir is about 40 MGD. Adding the reservoir to that system increased the average annual yield to over 60 MGD.

Reservoir construction costs are discussed in Chapter 3 of the *Consolidated Water Supply Plan Support Document*. Based on that information, capital costs per gallon of storage for a 5 billion gallon reservoir range from about $0.015/gallon to $0.017/gallon depending on the reservoir footprint. Analysis suggests land costs affect the total project costs more than berm height for reservoirs designed to accommodate water depths less than 12 feet. The only data readily available on reservoir operation and maintenance costs in southwest Florida are from Tampa Bay Water's C.W. Bill Young Reservoir in Hillsborough County (Tampa Bay Water 2005). The contracted annual reservoir operation and maintenance costs for this 1,200-acre, 15 billion gallon reservoir averages $867,000/year, including an optional algaecide application, which comprises about 40 percent of that average annual cost. Calculated per acre of water surface, this represents an annual operation and maintenance estimate of $722/acre. Calculated per gallon of storage volume, the cost is $0.0001/gallon. These annual costs reflect general operations, water quality maintenance and preventative maintenance. Annual costs do not reflect any significant capital repairs that may be periodically required.

Reclaimed Water

> Reclaimed water is water that has received at least secondary treatment and basic disinfection, and is reused after flowing out of a domestic wastewater treatment facility. Reuse is the deliberate application of reclaimed water for a beneficial purpose, in compliance with the Florida Department of Environmental Protection (FDEP) and water management district rules.

Reclaimed water is a key component of Florida's regional water supply plans for both wastewater management and water resource management. Reclaimed water strategies in the regional water supply plans can include such measures as further development of urban reclaimed water systems, reclaimed water system interconnections, and ASR for storage and groundwater recharge. In the LWC Planning Area, over 80 percent of wastewater is beneficially reused.

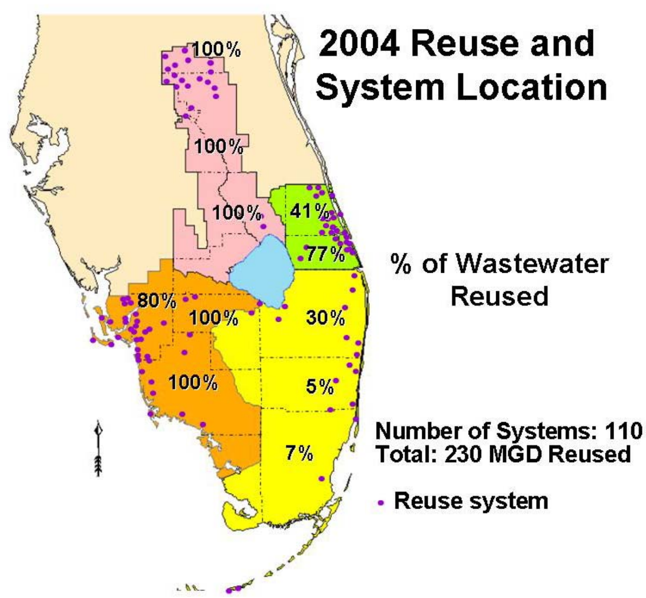

Figure 9. 2004 Reuse and System Locations.

Potential uses of reclaimed water include landscape irrigation (e.g., residential lots and golf courses), agricultural irrigation, groundwater recharge, industrial uses, environmental enhancement and fire protection.

Reclaimed water offers an environmentally sound means for managing wastewater that dramatically reduces environmental impacts associated with discharge of secondary treated effluent. In addition, use of reclaimed water provides an alternative water supply for many activities that do not require potable quality water, such as irrigation, which serves to conserve available supplies of potable quality water. Finally, some types of reclaimed water offer the ability to recharge and augment available water supplies with high quality reclaimed water.

In addition to costs for transmission and distribution system installation, reclaimed water capital costs typically include upgrading wastewater treatment facilities to advanced secondary treatment by adding filtration and high-level disinfection. Additional upgrades to "advanced wastewater treatment," which reduce nitrogen and phosphorous, may be needed if rehydration or wellfield recharge projects are contemplated. A generalized cost example for adding 5 MGD in high-level disinfection and filtration (i.e., conversion to advanced secondary treatment) at a wastewater treatment plant (WWTP) currently using secondary treatment is provided in **Table 6**. To ensure consistency with other comparative cost estimates in this chapter, it was presumed an additional 5 acres of property adjacent to the existing facility would be required (1 acre per MGD of capacity) for this installation. Assumptions relative to debt service are consistent with the other examples in this chapter. The costs shown do not include capital costs for installation, and operation and maintenance costs for reclaimed transmission and distribution pipelines, which would be significant. It must also be noted that these costs also do not reflect the capital investment and operation and maintenance costs for the original secondary treatment wastewater treatment plant, as these costs would have been necessary regardless of whether or not the facility provides reclaimed water. A listing of reclaimed water facilities and capacities is provided in the Potable and Wastewater Treatment Facilities **Appendix E**.

Table 6. Estimated Project Costs for Upgrade from Secondary to Advanced Secondary Treatment.

Treatment	Total Capital	Capital $ per gallon of Capacity	Annual O & M	Unit Cost ($/1,000 gallons)
Addition of 5 MGD filtration and high level disinfection to existing secondary treatment WWTP	$5,100,000	$1.02	$113,000	$0.30

Reclaimed water is also emphasized in policy documents, such as the April 2002 Florida Water Conservation Initiative and the 2001 Florida Water Plan. The Water Resources Implementation Rule (Chapter 62-40, Florida Administrative Code) as amended in 2005, requires the Florida Department of Environmental Protection (FDEP) and water management districts to advocate and direct the reuse of reclaimed water as an integral part of water management programs, rules and plans. The South Florida Water Management District (SFWMD or District) requires all applicants for water use permits to use reclaimed water unless the applicant can demonstrate it is not available or it is not technically and environmentally feasible to do so.

Additional guidance relating to the implementation of water reuse in Florida is given in the 2003 FDEP *Water Reuse for Florida – Strategies for Effective Use of*

Reclaimed Water report. The following strategies, identified in the report, are the ones most directly related to the development of regional water supply plans:

- Encourage groundwater recharge and indirect potable reuse.
- Encourage metering and volume-based rate structures.
- Encourage use of reclaimed water in lieu of other water sources.
- Encourage use of supplemental water supplies.
- Facilitate seasonal reclaimed water storage.
- Encourage reuse system interconnects.
- Encourage integrated water education.
- Link reuse to regional water supply planning.
- Implement viable funding programs.

The report provides a road map for the State of Florida's Water Reuse Program into the 21st century. The *Water Reuse for Florida* Report (Reuse Coordinating Committee 2003) is available from the FDEP Web site at: http://www.floridadep.org/water/reuse/techdocs.htm.

Reclaimed Water System Interconnects

Reclaimed interconnects are connections between two or more reclaimed water distribution systems (which may be owned or operated by different utilities), or between two or more domestic wastewater treatment facilities that provide reclaimed water for reuse activities. Reclaimed water system interconnects offer a means to increase both the efficiency and reliability of reclaimed systems. When two or more reclaimed water systems are interconnected, additional system flexibility and reliability are often developed. For example:

- One system may be newer with fewer customers and be adjacent to a more mature system that could use additional reclaimed water to meet the needs of its customers.
- An interconnect between a mature reclaimed water system and a system that has no reclaimed water, or limited reclaimed water customers, can help avoid (or limit) the need for a supplemental ground or surface water supply to meet seasonal demands in the more mature system.
- If one reclaimed water facility experiences a temporary problem with supplying reclaimed water of acceptable quality, the interconnect with another facility can provide a means to enable continued delivery of reclaimed water to system customers, while the problem is resolved.

- Interconnects may offer the ability to share system storage facilities, which would increase flexibility, while maximizing use of existing storage facilities. As ASR becomes more common as a means for storing reclaimed water, reuse system interconnects could provide opportunities for development of shared ASR systems as key components of regional reclaimed water programs.

As recommended in the 2000 Lower West Coast (LWC) Plan, the District initiated the Regional Irrigation Distribution System (RIDS) Project. This project included feasibility studies to evaluate and support the interconnection of reclaimed water systems in the LWC Planning Area. The intent of the interconnections is to make reclaimed water available to a wider customer base, as well as improve opportunities for storage of reclaimed water and seasonally available surface water that might be used to supplement the reclaimed system. **Appendix G** provides more detailed information regarding the RIDS feasibility studies and project implementation.

Nontraditional

Strategically located surface water storage (primarily storage in combination with improved stormwater management systems) could improve stormwater quality, recharge Surficial Aquifer wellfields, reduce the potential for saltwater intrusion and reduce wetland drawdowns. On-site storage in agricultural areas may reduce the need for water from other freshwater source options. Stormwater reservoirs could be located with ASR facilities and provide a water source for the facility.

CONSERVATION

Water conservation is regarded as an important component in integrated water resource management and vitally important for the LWC Planning Area. Measures to use water more efficiently can be less expensive than projects that increase supply. Other important advantages of conservation include reducing stress on natural systems. Water conservation projects are often easier to implement than supply projects due to less complex permitting, lower costs and acceptance by the public.

Increased use of reclaimed water and increased water conservation and research was recommended in the 2000 LWC Plan to meet the region's projected water demands and to reduce the potential for harm to wetlands and water resources. The various definitions of harm are provided in **Chapter 3**.

A Statewide Effort

In response to growing water demands, water supply problems and one of the worst droughts in Florida's history, the FDEP led a statewide Water Conservation Initiative to find ways to improve efficiency in all categories of water use. Hundreds of stakeholders participated in the initiative, which addressed all water use classes and subsequently offered alternatives to save water. Fifty-one cost-efficient alternatives were published in *The Florida Water Conservation Initiative* (FDEP 2002). These alternatives can be found in the *Consolidated Water Supply Plan Support Document* (SFWMD 2005–2006). The conservation methods best suited to the scope of the LWC Plan Update are presented in **Appendix I**.

In addition to policy and regulatory measures, the following conservation measures were the highest ranked of the Water Conservation Initiative alternatives:

Agricultural Water Conservation

Agricultural irrigation accounts for one of the largest water uses in the LWC Planning Area. Improvements in the recovery and recycling of irrigation water and greater use of reclaimed water for irrigation have already resulted in significant water savings throughout the region.

Over 66 percent of the citrus acreage in the LWC Planning Area is now irrigated using low-volume technology or microirrigation, while the remaining acreage is irrigated by flood irrigation. Much of the acreage currently irrigated by flood irrigation is located in Chapter 298 Districts (Chapter 298, F.S.), where several growers use a method of rain harvesting which recycles water after each use and moves it from one citrus grove to another. Conversion of citrus acreage from flood irrigation to microirrigation will continue to increase water savings. The U.S. Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS) has promoted water conservation through conversion of flood irrigation systems to low-volume technology with its Environmental Quality Improvement Program (EQIP) cost-sharing program.

Urban Water Conservation

Landscape Irrigation

Landscape irrigation for watering lawns, ornamental plants and golf courses can be significantly reduced through more efficient irrigation system design, installation and operation, and by reducing the amount of landscape requiring intensive irrigation. Rain sensors can save an average of 27,000 gallons per year per home irrigation system. If 75 percent of homes in the LWC Planning Area were to install rain sensors, the region could save an estimated 9.9 MGD annually.

Water Meter

Indoor Water Use

Indoor water use accounts for a major portion of demands on public water supply. The greatest potential for conserving water in this sector is through increasing the number of Florida homes and businesses using water efficient toilets, clothes washers, showerheads, faucets and dishwashers. Plumbing retrofit programs were one of the Water Conservation Initiative's highest ranked alternatives and were recommended in the 2000 LWC Plan.

If 75 percent of homes built before 1984 were to retrofit at least one toilet and one showerhead, the LWC Planning Area could potentially achieve a total annual savings exceeding 12 MGD. Whenever indoor water use is reduced, there is also a reduction in wastewater. Achieving this savings is highly dependent on cooperating utilities, and several utilities have conducted small-scale retrofit projects.

The SFWMD will continue to devise programs for retrofits, provide Water Savings Incentive Program (WaterSIP) funding, technical assistance and outreach. The District's WaterSIP is tailored to assist the community to partially fund projects, such as large-scale retrofits, as recommended by this LWC Plan Update. Water pricing rate structures (including drought rates) and informative utility billing are effective techniques to encourage water users to conserve water. Each year the District sets parameters for WaterSIP proposals that stress water conservation options recommended in the regional water supply plans.

Industrial, Commercial and Institutional

Industrial, commercial and institutional users can improve water use efficiency through certification programs for businesses implementing industry-specific best management practices and through water use audits, improved equipment design and installation, and greater use of reclaimed water.

General Policy Considerations

Reuse of reclaimed water can be used more efficiently through pricing and metering. Metering of reclaimed water use and implementation of volume-based rates for reclaimed water is a major strategy contained in the *Water Reuse for Florida – Strategies for Effective Use of Reclaimed Water Report* (Reuse Coordinating Committee 2003) to promote efficient use of reclaimed water.

The role of education and outreach programs and the effect of cooperative funding programs, such as the Mobile Irrigation Lab (MIL) and other agricultural irrigation programs were also reviewed to assess the potential for water conservation in the LWC Planning Area. Cooperative funding, cost-sharing, WaterSIP and other incentives to support cost-effective projects within all sectors of water use promoting increased efficiency have been effective.

The MIL Program began in south Florida in 1989 with an agricultural lab in the LWC Planning Area. The mission of the program is to educate and demonstrate to agricultural and urban water users how to irrigate efficiently. Currently, there are 15 operational labs in the SFWMD. Ten are District funded and five are funded by other sources. Twelve counties are served by the labs Districtwide. Funding is provided by a multiagency partnership between federal, state, regional and local levels of government.

Technician Collecting Discharge Volume from Microirrigation Spray Jet Emitter

In addition to the agricultural lab, which provides evaluations in Collier, Lee, Hendry, Glades and Charlotte counties, two of the four urban labs in the LWC Planning Area are District-funded. The Collier County urban lab has been in operation since 2002, and the Lee County urban lab has been in operation since 1994.

In the past two years (2004 and 2005), recommendations for improvements to irrigation systems in the LWC Planning Area have yielded average potential water savings of 0.9 MGD. Districtwide, each urban MIL saves an average of 0.1 MGD (100,000 gallons per day) and each agricultural MIL saves an average of 0.7 MGD. Plans to start additional labs within the District's boundaries are under way.

More information on conservation efforts and plan recommendations for the LWC Planning Area can be found in **Appendix I**.

Conserve Florida Program

During finalization of this plan update, legislation was passed incorporating and codifying the development of the statewide Water Conservation Program for public water supply (Section 373.227, F.S.). The law provides goals that must be addressed as part of the program, called "Conserve Florida," which encourages conservation by utilities and stresses accountability.

As provided in Section 373.227(4), F.S., a water management district must approve a goal-based water conservation plan as part of a consumptive use permit if a utility provides reasonable assurance that the plan will achieve effective water conservation, at least as well as the water conservation requirements adopted by the appropriate water management district, and is otherwise consistent with the statute.

Also required by Florida House Bill 293, and included in the Conserve Florida Program, are guidelines that address Xeriscape™ landscaping and the development of a statewide model ordinance to increase landscape irrigation efficiency. In addition, the 2004 legislation allows water management districts to require the use of reclaimed water, if feasible, and to encourage metering of newly implemented reuse projects, enabling utilities to charge for the actual volume of water used. See Chapters 367, 373, 403, 570 of the Florida Statutes for specific legislative authority on the statewide Water Conservation Program.

SUMMARY

Rapid growth in the LWC Planning Area will add 197 MGD in new water demand by 2025. Demand will increase in all six major use categories with the largest increase in Public Water Supply. Additional supplies must be developed and conservation measures must be improved to meet future needs. Since the amount of additional freshwater supplies to meet 2025 demand is limited, development of new alternative supplies is essential. Viable alternative sources include brackish water, expansion of the reclaimed system and the capture of seasonally available surface water.

The addition of storage, most likely ASR, will be critical to expansion and maximum use of the reclaimed system, as well as augmentation of the system using wet-weather surface water flows. The expansion of storage also holds promise in providing new potable supply opportunities and potentially providing water that could be used to mitigate wetland impacts and improve freshwater wellfield yields.